MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY

Permitting and Compliance Division
Water Protection Bureau
P.O. Box 200901
Helena, MT 59620-0901

Permit Fact Sheet
Montana Ground Water Pollution Control System (MGWPCS)

Permittee:	The Koehler Organization 2011 8th Ave. NE Aberdeen, SD 57401
Permit Number:	MTX000130
Facility Name:	Holiday Inn Express - Billings
Facility Location:	SE1/4 Section 19, Township 1N, Range 27E, Yellowstone County (Attachment 1)
Facility Contact(s):	James P Koehler
Receiving Water:	Class II Ground Water
Number of Outfalls:	1 – For the purposes of fee determination
Outfall(s)/Type:	001 - Subsurface Drainfield –Domestic Strength Wastes

I. PERMIT STATUS

This statement of basis is for the renewal of the wastewater discharge permit for Holiday Inn Express – Billings pursuant to the Montana Ground Water Pollution Control System (MGWPCS) rules. This wastewater system was initially issued a MGWPCS discharge permit on January 9, 2002. The permittee, The Koehler Organization, submitted a permit renewal application (GW-1) on August 11, 2006. A request for supplemental information was made by the Department on September 5, 2006. The MGWPCS application was deemed complete on October 2, 2006. This was a new source and is therefore subject to the Montana Nondegradation Policy (75-5-303, MCA) and administrative rules (ARM 17.30.701, et seq.).

This subdivision was also subject to review and approval under the Montana Sanitation in Subdivision Act. It was approved in September 2001 (EQ #01-2553).

II. FACILITY INFORMATION

A. General Description

This facility is a 66-room motel. It is located on 3.48 acres (known as Lot 7-A-1 Cole Acreage Tracts) of land that are adjacent to the Interstate (I-90) east bound on-ramp at the Johnson Lane interchange, approximately 2 miles east of Billings. The potable water source for this facility is a public water system, the Lockwood Water System.

B. Inspections

On October 4, 2005, the Department conducted a routine inspection of this facility. The inspection report noted one violation of the discharge permit. The violation was regarding failure to maintain records as required in Part II, Section H of the permit.

C. Wastewater Collection, Treatment, and Disposal

The wastewater treatment system serves a 66-unit motel. The wastewater treatment system includes a 12,000 gallon septic tank to remove settleable and floatable solids. From the septic tank the wastewater is pumped to a re-circulating sand filter (RSF) to provide additional treatment of biological oxygen demand (BOD_5), total suspended solids (TSS), nitrogen, and pathogens. After treatment in the RSF, the effluent is discharged to a dosing tank and then discharged to a six-zone pressure-dosed subsurface drainfield.

The effluent rate is measured via redundant pump dose counters and pump run-time meters.

D. Design Capacity

The design capacity for the wastewater treatment system is 9,000 gpd.

III. DESCRIPTION OF THE DISCHARGE

A. Outfall Location

The current permit authorizes the permittee to discharge residential strength wastewater from an RSF treatment system to a subsurface drainfield (Outfall 001). Outfall 001 is located in the southwest corner of the property (see Attachment 2).

B. Past Monitoring Data/Effluent Characteristics

1. Past Monitoring Data

Pursuant to the existing MGWPCS permit, the operator has been collecting quarterly effluent samples and submitting the results to the Department on their discharge monitoring reports (DMRs) since the system began discharging wastewater in the second quarter of 2002. The data are summarized in Table 1.

Table 1: Effluent Characteristics [(1)] for the POR 4/30/02 to 9/30/06.

Parameter	Location	Units	Previous Permit Limit	Maximum Value	Minimum Value	Average Value	Number of Samples
Flow, Daily Average	Effluent	gpd	(3)	6,984	2,131	4,248	18
Biochemical Oxygen Demand (BOD_5)	Influent	mg/L	(3)	(2)	(2)	(2)	(2)
	Effluent	mg/L	(3)	28.4	2.0	12.2	18
	Effluent	% removal	(3)	(2)	(2)	(2)	(2)
	Effluent	lbs/day	(3)	(2)	(2)	(2)	(2)
Total Suspended Solids (TSS)	Influent	mg/L	(3)	(2)	(2)	(2)	(2)
	Effluent	mg/L	(3)	11.8	0.06	5.02	18
	Effluent	% removal	(3)	(2)	(2)	(2)	(2)
	Effluent	lbs/day	(3)	(2)	(2)	(2)	(2)
Escherichia coli (E. coli)	Effluent	No./100ml	(3)	(2)	(2)	(2)	(2)
pH	Effluent	s.u.	(3)	(2)	(2)	(2)	(2)
Specific Conductance	Effluent	µS/cm	(3)	(2)	(2)	(2)	(2)
Chloride	Effluent	mg/L	(3)	(2)	(2)	(2)	(2)
Total Ammonia	Effluent	mg/L	(3)	18.5	0.8	9.47	18
Total Kjeldahl Nitrogen, as N	Effluent	mg/L	(3)	(2)	(2)	(2)	(2)
Nitrate + Nitrite, as N	Effluent	mg/L	(3)	32.5	0.4	9.6	18
Total Inorganic Nitrogen	Influent	mg/L	(3)	(2)	(2)	(2)	(2)
		lbs/day	(3)	(2)	(2)	(2)	(2)
Total Inorganic Nitrogen	Effluent	mg/L	28.0	37.9	10.01	19.1	18
		lbs/day	2.1	0.98	0.27	0.64	18
Total Phosphorus	Effluent	mg/L	(3)	7.3	1.8	5.42	18
		lbs/day	0.8	0.37	0.038	0.19	18
Oil and Grease	Effluent	mg/L	(3)	(2)	(2)	(2)	(2)

Footnotes:

(1) Conventional and nonconventional pollutants only, table does not include toxics.
(2) Data not available: no samples collected for this parameter.
(3) No limit in previous permit.

The permit concentration effluent limits for total inorganic nitrogen (TIN) were exceeded in 3 of the first four quarters. However, since that time (first quarter of 2003) the TIN concentration effluent limit has not been exceeded. It is not unusual for a new wastewater system to have elevated nitrogen concentrations during the startup of the system because it takes time for the proper bacteria to populate the system. Even though the concentration limit was exceeded several times, the effluent load limit for TIN has never been exceeded.

Other parameters listed in Table 1 are within the concentration ranges expected for this type of wastewater treatment system.

IV. SITE CHARACTERISTICS

A. Soils

The drainfield is constructed in alluvial deposits of the Yellowstone River. The alluvial material typically consists of a shallow clay/silt layer overlying more permeable water-bearing sand and gravel deposits. The drainfield is located in soils that are mapped by the National Resources Conservation Survey (NRCS) as the Fort Collins Series. The Fort Collins Series is characterized as well-drained soils that are more than 60 inches deep. The upper 18 inches is described as grayish-brown and light-yellowish brown clay loam. Underneath is several feet of light-gray loam. These soils are listed as somewhat limited for wastewater absorption fields due to slow water movement

B. Hydrology

The nearest downgradient surface water is an irrigation ditch, Coulson Ditch. The ditch is approximately 1,680 feet northwest of outfall 001 (see Attachment 1).

C. Hydrogeology

Hydraulic conductivity of the sand and gravel in the alluvial aquifer is based on existing local well logs. The hydraulic conductivity of the alluvial material is estimated at 247 feet per day (ft/d). The hydraulic gradient in the shallow ground water is 0.0083 ft/ft N42^{o}W as based on an August 1978 ground water elevation map of the valley (Hutchinson, 1983). Ground water depth is 10 to 20 feet below ground surface in this area.

Ground water samples were collected by Engineering Inc. on two dates from two nearby wells in December 2000 and April 2001. The first well (MBMG # M170643) is completed in the shallow aquifer (perforated from 75 to 80 feet below ground surface). This well is located approximately 300 feet south of the drainfield. The nitrate+nitrite (as N) concentration in the well was 2.3 mg/L, and the specific conductivity of the water was 1,938 umhos/cm. A second ground water sample collected from another well approximately 1,000 feet southeast of the drainfield had a nitrate+nitrite (as N) concentration of 2.1 mg/L, and the specific conductivity of the water was 2,380 umhos/cm. There is no well log available for the second well. A water quality study of the valley (Hutchinson, 1983) confirms that the specific conductivity of ground water in this area is approximately 2,000 umhos/cm. The classification of the receiving ground water is Class II.

V. RECEIVING WATER

A. Water-Use Classification and Applicable Water Quality Standards

Based on the two local ground water samples described in the previous section with specific conductivities of 1,938 and 2,380 umhos/cm, and the Hutchinson (1983) report, the receiving water for Outfall 001 is a Class II ground water.

Class II ground water has a specific conductivity of greater than 1,000 and less than or equal to 2,500 umhos/cm at 25 degrees Centigrade, as defined by ARM 17.30.1006(2). According to ARM 17.30.1006(2)(a), the quality of Class II ground water must be maintained so that these waters are at least marginally suitable for public and private water supplies, culinary and food processing, irrigation, commercial and industrial purposes, drinking water for livestock and wildlife. Human health standards listed in DEQ Circular 7 (February 2006) apply to concentrations of dissolved substances in Class II ground water.

The applicable ground water quality standards and nondegradation significance criteria are included in Table 2.

Table 2. Applicable Water Quality Standards and Nondegradation Significance Criteria

Parameter	DEQ-7 Human Health Ground Water Standards	Nondegradation Significance Criteria in Ground Water for Level II Treatment
Nitrate (as N)	10 mg/L	7.5 mg/L
Inorganic Phosphorus	no standard	50 year breakthrough [(1)]
Escherichia coli (E. coli) Bacteria	<1 organism per 100 ml	<1 organism per 100 ml

[(1)] The phosphorus significance criteria is listed in ARM 17.30.715(1)(e): "changes in concentration of total inorganic phosphorus in ground water if water quality protection practices approved by the department have been fully implemented and if an evaluation of the phosphorus adsorptive capacity of the soils in the area of the activity indicates that phosphorus will be removed for a period of 50 years prior to a discharge to any surface waters."

VI. MIXING ZONE

The permittee currently discharges all wastewater from Outfall 001 and has previously been granted a standard ground water mixing zone for nitrate (as N) of 500 feet [ARM 17.30.517 and 17.30.505(1)(a)] for Outfall 001 (see Attachment 2). The permittee must comply with the ground water mixing zone rules pursuant to ARM Title 17, Chapter 30, Subchapter 5. Ground water standards may be exceeded within the mixing zone, provided all existing and future beneficial uses of the state waters are protected [ARM 17.30.1005]. The permittee will be required to comply with the applicable ground water quality standards at the boundaries of the mixing zone [ARM 17.30.508(1)(a), ARM 17.30.1006(1)(b), DEQ Circular 7].

The shape of the mixing zone is determined using the drainfield dimensions and information on ground water movement. The hydraulic gradient in the shallow ground water is 0.0083 ft/ft N42^{o}W which is based on an August 1978 ground water elevation map of the valley (Hutchinson, 1983).

VII. PROPOSED EFFLUENT LIMITS

The RSF is considered to be Level II treatment according to ARM 17.30.702(11). Level II wastewater treatment systems must provide a higher degree of treatment than a conventional wastewater treatment system. A Level II system must provide at least a 60 percent removal of total nitrogen (TN) in the raw wastewater or an effluent TN concentration of 24 mg/L or less beneath the drainfield [ARM 17.30.702(11)]. The Department has established that a properly installed, operated and maintained RSF wastewater treatment system meets the definition of a Level II system. TN is the combination of nitrate, nitrite, ammonia and organic nitrogen.

The permit limit for TN will be set at 26 mg/L in the effluent, prior to discharge to the drainfield. An additional 7% of nitrogen treatment is assumed to occur within the drainfield, a final TN effluent limit of 24 mg/L will be applied.

The RSF system is not designed to treat the inorganic phosphorus that is present in the wastewater.

Based on the performance of the system, the effluent limits are set forth in Table 3.

Table 3. Effluent Limits for Outfall 001
(at the dose tank prior to discharge to the subsurface drainfield)

Parameter	Daily Maximum[(1)] Concentration (mg/L)
Total Nitrogen, as N (TN)	26
Inorganic Phosphorous, as P	NA

(1) See definitions, Part V. of the permit.
NA = Not Applicable

The current permit uses a technology-based effluent limit of 28 mg/L for total inorganic nitrogen (TIN), which is the combination of nitrate, nitrite and ammonia. The limit is being changed in the renewed permit from 28 to 26 mg/L because the 28 mg/L limit was calculated incorrectly by assuming that 7% nitrogen reduction in the drainfield was 7% of the raw wastewater concentration (60 mg/L) rather than the correct concentration of the effluent entering the drainfield. The limit is also being changed in the renewed permit from TIN to TN to account for the organic nitrogen in the effluent which is able to convert to nitrate in the subsurface (the TIN does not account for the organic fraction of nitrogen in the effluent).

The current permit incorrectly uses total phosphorus as the limited parameter. The renewed permit uses the correct parameter, inorganic phosphorus, which is the regulated parameter in DEQ-7 (February 2006) and ARM 17.30.715(1)(e).

VIII. PROPOSED WATER QUALITY-BASED EFFLUENT LIMITS

The Montana Water Quality Act requires that a discharge to state waters shall not cause a violation of a water quality standard outside a Department authorized mixing zone. Ground water quality standards apply at the hydraulically downgradient mixing zone boundary in the unconfined aquifer. Water quality limitations must be established in permits to control all pollutants or pollutant parameters that are or may be discharged at a level which will cause, have reasonable potential to cause or contribute to an excursion above any state water quality

standard. The permittee must comply with Montana Numeric Water Quality Standards included in DEQ Circular 7 (February 2006) and the protection of beneficial uses (ARM 17.30.1006). Ground water quality standards may be exceeded within a Department authorized mixing zone, provided that all existing and future beneficial uses of the state waters are protected (ARM 17.30.1005).

A. Nitrate

The wastewater system constitutes a new or increased source [ARM 17.30.702(18)(a)]. The Class II ground water is considered high quality water and is subject to Montana's Nondegradation Policy (75-5-303, MCA). The applicable ground water standard is based on nondegradation, with a nitrate concentration limit of 7.5 mg/L [ARM 17.30.715 (1)(d)(iii)] at the end of the standard, 500-foot mixing zone.

The allowable discharge concentration is derived from the mass balance water quality equation which considers dilution and background concentration of the receiving water (EPA, 2000).

$$C_2 = \frac{C_3(Q_1 + Q_2) - C_1 Q_1}{Q_2}$$

C_1 = ambient ground water (background) concentration, is 2.3 mg/L
C_2 = allowable discharge concentration (TN) beneath the drainfield
C_3 = ground water concentration limit for pollutant (from DEQ Circular 7 or other appropriate water quality standard) at the end of the mixing zone is 7.5 mg/L, instantaneous (no single sample shall exceed)
Q_1 = ground water volume is 10,338 ft^3 / day
Q_2 = maximum flow of discharge (design capacity of system is 1,203 ft^3/day)

The volume of ground water that will mix with the discharge (Q_1) is estimated using Darcy's equation: $Q_1 = K\ I\ A$. The calculated value of Q_1 is 10,338 ft^3/day for the mixing zone; assuming an aquifer hydraulic conductivity (K) value of 247 ft/day, an average measured gradient (I) of 0.0083 ft/ft, and a cross sectional area (A) of flow at the downgradient boundary of the standard 500-foot mixing zone of 5,043 ft^2.

The design capacity of the wastewater disposal system is 9,000 gpd, or 1,203 ft^3/day. The nitrate (as N) concentration must not exceed 7.5 mg/L at the end of the mixing zone. The ambient concentration of nitrate (as N) in the alluvial ground water is 2.3 mg/L (C_1), based on the sample from a well (MBMG #M170643) completed in the alluvial aquifer. It is assumed that the entire TN load in the effluent converts to nitrate (as N) and enters the ground water. The value of C_2 calculated for the above equation is:

$$C_2 = [7.5(10{,}338 + 1{,}203) - (2.3)(10{,}338)] / 1{,}203$$

$$C_2 = 52.2\ mg/L$$

Using the equation above, the projected maximum concentration of the TN in the effluent discharged to ground water must not exceed 52.2 mg/L at Outfall 001. These effluent limits ensure the nitrate (as N) concentration at the end of the ground water mixing zone is at or below

the nondegradation significance criterion of 7.5 mg/L. As discussed in Part VII, nitrate reduction of approximately 7 percent is assumed to occur beneath the drainfield. Therefore, to discharge a TN concentration of 52.2 mg/L below the drainfield, the effluent limit from the dose tank prior to discharge to the subsurface drainfield is calculated at 56.1 mg/L of TN (see Table 4).

The effluent concentration of TN must not exceed 56.1 mg/L at the design rate of 9,000 gpd to maintain a concentration that is less than the nondegradation water quality limit of 7.5 mg/L for nitrate (as N) in the ground water at the mixing zone boundary. The WQBEL will be based on the continuous (90-day average) flow rate for the system (9,000 gpd maximum) and the daily maximum concentration (mg/L) as the TN load in pounds per day. These limits do not take into account other factors involved in predicting pollutant transport, such as biological denitrification below the drainfields. The WQBEL effluent limit will be expressed as a load limit using the following equation:

Load limit (lbs/day) per outfall = 90-day average effluent flow rate (gpd) ***x*** *daily maximum effluent concentration (mg/L)* ***x*** *8.34 x* 10^{-6}

Load limit (lbs/day) per outfall = (9,000 gpd) ***x*** *(56.1 mg/L)* ***x*** *(8.34 x* 10^{-6}*)*

Load limit (lbs/day) per outfall = 4.21 lbs/day

B. Phosphorus

Phosphorus is removed mainly through soil sorption processes, which are slow and vary based on soil composition. The inorganic phosphorus limitations are imposed to ensure that the quality of the effluent meets the nondegradation limit prior to discharge into any surface water [ARM 17.30.715(1)(e)]. The effluent limits do not include a concentration limit for inorganic phosphorus because the method used to determine compliance is the 50-year breakthrough criteria. The 50-year breakthrough nondegradation criterion is based on the amount of soil available to adsorb the phosphorus load discharged from the wastewater system between the discharge point and the surface water and the average load of inorganic phosphorus from the wastewater source. An inorganic phosphorus concentration of 10.6 mg/L is the estimated concentration found in residential wastewater, which is consistent with published values (USEPA, 2002). The inorganic phosphorus load from this facility is 0.8 pounds per day (lbs/day) based on a concentration of 10.6 mg/L and design flow of 9,000 gpd. The WQBEL for inorganic phosphorus will remain at 0.8 lb/day (see Table 4).

Based on the ground water flow direction of N42^{o}W, dimensions of the drainfield at this site, a phosphorous breakthrough analysis shows the breakthrough time to the surface water (Coulson Ditch) is greater than 50 years. Therefore, the discharge is considered nonsignificant degradation pursuant to the criteria of ARM 17.30.715(1)(e).

C. Escherichia Coli Bacteria

The current permit uses Fecal Coliform bacteria as the pathogen indicator. Since the current permit was issued, the bacterial water quality standard in Circular DEQ-7 was changed from fecal coliform to escherichia coli (E. coli) bacteria. Therefore, the permit renewal will use E. coli as the bacterial parameter.

A wastewater treatment system that is sited and operated properly should remove most, if not all, of the pathogenic bacterial indicators within 2 to 3 feet of the drainfield's infiltrative surface

(USEPA, 2002). There is no mixing zone for E. coli bacteria. The point of compliance in the ground water is at the downgradient edge of the drainfield. The E. coli water quality standard is <1 organism per 100 ml in the ground water (DEQ Circular 7). Due to the following site-specific criteria, ground water monitoring for E. coli bacteria at the edge of the drainfield will not be required at this time.

- the shallow sediments above the ground water are primarily composed of clay and silt, which will aid in filtering out pathogens from the discharged effluent, and
- the treatment system utilizes an RSF which will reduce the amount of pathogens discharged from the drainfield, and
- the drainfields are pressured-dosed, which minimizes saturated conditions and therefore maximizes the die-off rate in the natural sediments, and
- the location of the ground water mixing zone adjacent to and underneath the interstate limits the potential for future water wells in the vicinity of the mixing zone.

D. BOD_5 and TSS

BOD_5 and TSS are monitored for wastewater treatment system efficiency to ensure the effective removal of biological material and that the proper aerobic biological processes are being maintained. There are no numeric ground water quality standards for BOD_5 and TSS, however according to ARM 17.30.1006(2)(b)(ii) the beneficial uses for a Class II ground water must be maintained. BOD and TSS are not subject to nondegradation limitations unless they have a reasonable potential to affect a beneficial use based on the significance criteria for BOD_5 and TSS, which are narrative [ARM 17.30.715(1)(g) and DEQ Circular 7].

Table 4. Water Quality-Based Effluent Limits for Outfall 001 (at the dose tank prior to discharge to the subsurface drainfield)

Parameter	Daily Maximum[(1)] Concentration (mg/L)	90-Day Average Load[(1)] (pounds per day)
Total Nitrogen, as N	56.1	4.21
Inorganic Phosphorus, as P	NA	0.8

(1) See definitions, Part V of the permit
NA Not Applicable

IX. PROPOSED FINAL EFFLUENT LIMITS

The proposed effluent limitations for Outfall 001 are summarized in Table 5 and are based on the more restrictive of the technology and water quality criteria discussed in previous sections. The final proposed effluent concentration limit for TN is technology-based, relating to the expected performance of an RSF with drainfields with proper operation and maintenance. The concentration limit is proposed to ensure the system operates at the level II requirement with an effluent concentration limit for TN of 26 mg/L.

The final proposed TN effluent load limit (4.21 lb/day) is proposed based on the design capacity and the WQBEL concentration (56.1 mg/L). The load limit for TN is based on complying with the nondegradation water quality limit of 7.5 mg/L for nitrate (as N) at the end of the ground water mixing zone.

The effluent limit for inorganic phosphorus is water quality-based as determined according to nondegradation significance criteria. The 90-day average load limit will provide protection for the surface water.

Table 5. Numeric Effluent Limits for Outfall 001 (at the drainfield dose tank)

Parameter	Daily Maximum Concentration [(1)] (mg/L)	90-Day Average Load[(1)] (pounds per day)
Total Nitrogen, as N[(2)]	26	4.21
Inorganic Phosphorus, as P	NA	0.8

(1) See definitions, Part V of the permit.
(2) Total Nitrogen (TN) is the sum of nitrate, nitrite and total kjeldahl nitrogen (as N).
NA Not Applicable

Other Discharge Limitations:

The average daily design flow of effluent discharged to Outfall 001 shall not exceed 9,000 gpd.

A. Other Conditions

1. Operation and Maintenance

Community wastewater treatment and disposal systems are to be operated and maintained according to the manufacturer's instructions as provided in an owner's manual (DEQ Circular 4, Appendix D). Proper operation and maintenance (O&M) must be assured through an initial and a renewed service contract for the life of the system.

X. MONITORING REQUIREMENTS

A. Influent Monitoring

Influent monitoring will not be required.

B. Effluent Monitoring

Effluent monitoring is essential to ensure the effective treatment and consistency of the wastewater discharged from the facility. The effluent limits are established to protect the ground water from a change in water quality that would cause degradation [ARM 17.30.715] or cause a change in beneficial use [ARM 17.30.1006(2)(a)]. Samples or measurements shall be representative of the volume and nature of the monitored discharge at the outfall.

Effluent monitoring/sampling shall be conducted by collecting a composite sample from the wastewater treatment system dose tank that is representative of the discharge prior to discharging to the subsurface drainfield (Outfall 001). Effluent samples shall be submitted to the laboratory for analysis of all of the parameters in Table 6.

The permittee shall monitor the effluent at Outfall 001 for the parameters in Table 6 and at the frequency and with the type of measurement and sampling as indicated. If no discharge occurs during the entire monitoring period, it shall be stated in a Discharge Monitoring Report (DMR) that "no discharge" occurred.

TABLE 6. Parameters To Be Monitored in the Effluent at Outfall 001 (at the Drainfield Dose Tank)

Parameter, units	Frequency	Sample Type[(1)]
Effluent Flow Rate, gpd	Continuous	Continuous[(1)]
Total Suspended Solids,(TSS), mg/L	Quarterly	Composite[(1)]
Biological Oxygen Demand (BOD_5), mg/L	Quarterly	Composite
Total Kjeldahl Nitrogen, as N (TKN), mg/L	Quarterly	Composite
Nitrate+Nitrite (as N), mg/L	Quarterly	Composite
Nitrate (as N), mg/L	Quarterly	Composite
Ammonia (as N), mg/L	Quarterly	Composite
Total Nitrogen, as N (TN), mg/L	Quarterly	Calculated[(2)]
Inorganic Phosphorus, as P, mg/L	Quarterly	Composite
Total Nitrogen, as N (TN), lb/d	Quarterly	Calculated[(3)]
Inorganic Phosphorus, as P , lb/d	Quarterly	Calculated[(3)]

(1) See definitions, Part V of the permit.
(2) Total Nitrogen, as N = nitrate + nitrite, (as N) + total kjeldahl nitrogen, (as N)
(3) See definition of "quarterly average" in Part V of the permit.

The 90-day average load for TN and inorganic phosphorus are the sum of the calculated loads for each TN and inorganic phosphorus sample collected within the 90-day period, divided by the number of samples collected and analyzed for TN and inorganic phosphorus.

The effluent rate measurement is conducted via redundant pump cycle counters and pump run-time meters. These measurement methods, while not as accurate as a totalizing flow meter, were allowed to be used in the current permit because they have redundant systems and because those flow rates are verified against the indoor water use meter (irrigation water is a separate system) in the hotel (Engineering Inc. letter, May 14, 2002).

C. Ground Water Monitoring

Ground water monitoring is not required for this permit due to the following site-specific conditions:

- the shallow sediments above the ground water are primarily composed of clay and silt, which will aid in filtering out pathogens and treating other constituents from the discharged effluent;
- the treatment system utilizes an RSF which will reduce the amount of pathogens and nutrients discharged from the drainfield;
- the drainfields are pressured-dosed, which minimizes saturated conditions and therefore maximizes the pathogen die-off rate in the natural sediments;
- the location of the ground water mixing zone adjacent to and underneath the interstate limits the potential for future water wells in the vicinity of the mixing zone; and
- the nearest receiving surface water is 1,680 feet from the discharge location.

XI. NONDEGRADATION SIGNIFICANCE DETERMINATION

The Department has determined that this discharge constitutes a new or increased source for the purpose of the Montana Nondegradation Policy (75-5-303, MCA; ARM 17.30.702(16)). The applicable water quality standards for Class II ground water are summarized in Table 2. The

effluent limits for TN and inorganic phosphorus are based on compliance with water quality standards. The existing discharge will not exceed the water quality standard for nitrate (as N) of 7.5 mg/L at the hydraulically downgradient boundary of the standard 500-foot ground water mixing zone.

XII. INFORMATION SOURCES

In the development of the effluent limitations, monitoring requirements and special conditions for the draft permit, the following information sources were used to establish the basis of the draft permit and are hereby referenced:

ARM Title 17, Chapter 30, Sub-chapter 5 - Mixing Zones in Surface and Ground Water, September 1999.

ARM Title 17, Chapter 30, Sub-chapter 7 - Nondegradation of Water Quality, March 2000.

ARM Title 17, Chapter 30, Sub-chapter 10 - Montana Ground Water Pollution Control System (MGWPCS), March 2002.

Cherry, J.A. and Freeze, R. A., *Groundwater*, Prentice-Hall Inc., Englewood Cliffs, NJ., 1979. Chapter 2, pages 26-29.

DEQ Circular 4 – Montana Standards for Subsurface Wastewater Treatment Systems, 2002.

DEQ Circular 7 – Montana Numeric Water Quality Standards, February 2006.

DEQ, Memo-Regensburger, "Revised Modification of Phosphorous Concentration for Domestic Sewage in Nondegradation Reviews," October 29, 1998.

DEQ, "Nitrate Sensitivity Analysis Input Data", 1994.

DEQ, "Non-Point Source Water Quality Standard Operating Procedures" (4/1/95) at www.deq.state.mt.us/wqinfo/monitoring/SOP/Sap.asp

Engineering Inc, May 14, 2002. Letter to Tom Reid (DEQ) from Mac L. Fogelsang.

Engineering Inc., 2001. Ground Water Discharge Permit Application: Holiday Inn Express, Lot7-A-1, Cole Acreage Tracts.

GWIC Database, http://mbmggwic.mtech.edu

Hutchinson, R.D., 1983. Changes in the Shallow Ground-Water Resources of the Yellowstone River Valley near Billings, Montana, August 1968-1978. Montana Bureau of Mines and Geology. Hydrogeologic Map 6.

Lopez, D.A., Preliminary Geologic Map of the Billings 30' x 60' Quadrangle. Montana Bureau of Mines and Geology. Open File Report 336. 1999.

U.S. Environmental Protection Agency, February 2002. *Design Manual: Onsite Wastewater Treatment and Disposal System.* EPA 625/R-00/008.

Woessner, Wm. W., Thomas, Troy, Ball, Pat and DeBorde, Dan C., (April 1998), Virus Transport in the Capture Zone of a Well Penetrating a High Hydraulic Conductivity Aquifer Containing a Preferential Flow Zone: Challenges to Natural Disinfection. University of Montana, Missoula, Montana.

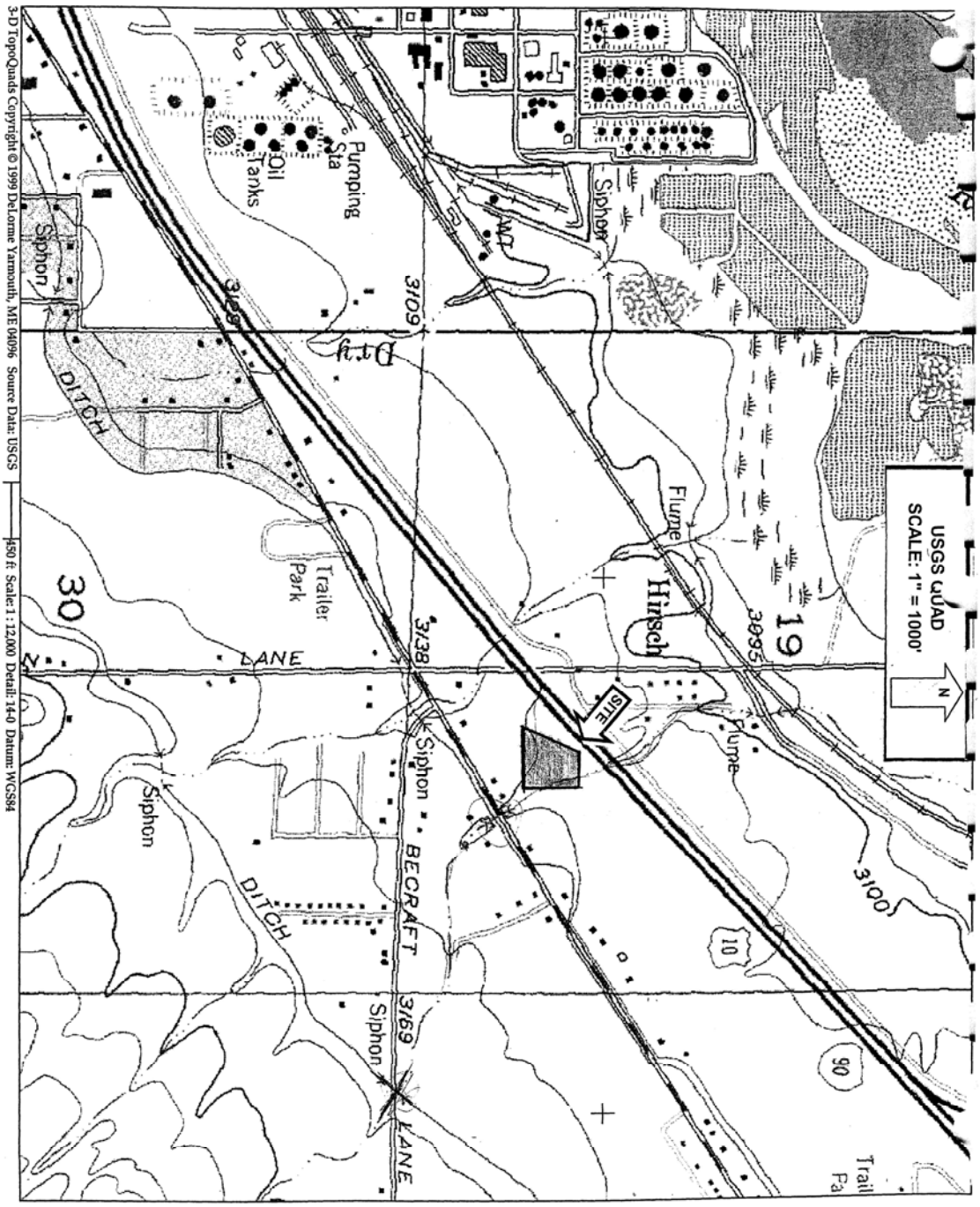
XIII. ATTACHMENTS

1 – Facility Location Map

2 – Site Map with Drainfield and Mixing Zone

Prepared by: Eric F. Regensburger **Date:** July 17, 2007

Attachment 1



Attachment 2